

Name: \_\_\_\_\_

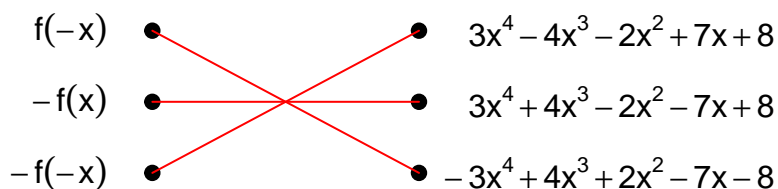
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**Exam: Function Reflections (Solution version 48)**

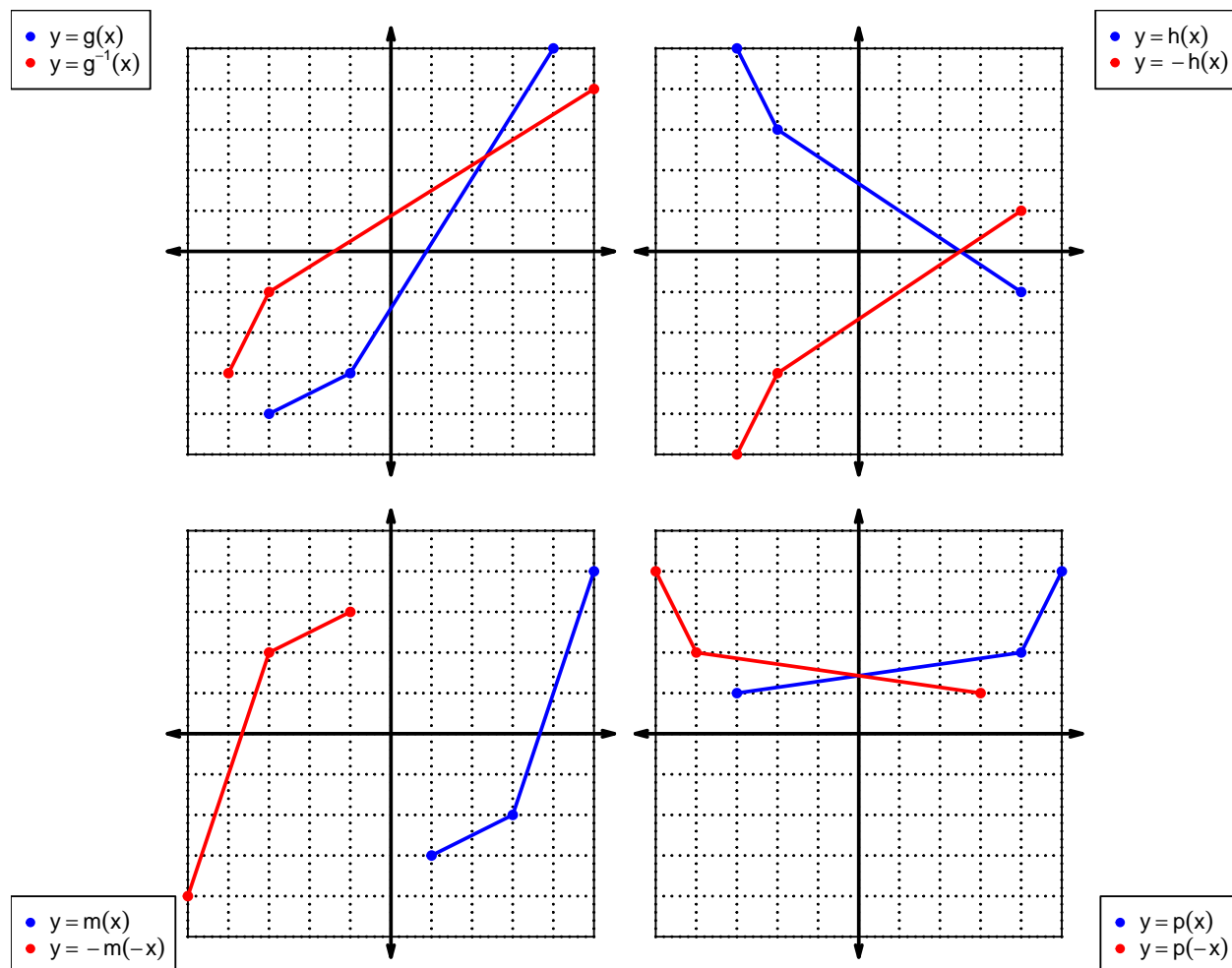
1. Let function  $f$  be defined by the polynomial below:

$$f(x) = -3x^4 - 4x^3 + 2x^2 + 7x - 8$$

Draw lines that match each function reflection with its polynomial:

**Reflections****Polynomials**

2. In each  $xy$  plane shown below, a function is graphed with blue. Draw the indicated reflections (as a second curve, indicated in legend) with black (or with whatever you have). The  $x$  axis is horizontal and the  $y$  axis is vertical (as typical), and the scale is equal on both axes.



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For all questions on this page, the functions  $f$ ,  $g$ , and  $h$  are defined by the table below.

$x$	$f(x)$	$g(x)$	$h(x)$
1	9	5	7
2	1	8	5
3	8	1	3
4	3	4	2
5	4	3	9
6	7	2	8
7	2	9	4
8	5	7	1
9	6	6	6

3. Evaluate  $g(1)$ .

$$g(1) = 5$$

4. Evaluate  $f^{-1}(2)$ .

$$f^{-1}(2) = 7$$

5. Assuming  $h$  is an **odd** function, evaluate  $h(-4)$ .

If function  $h$  is odd, then

$$h(-4) = -2$$

6. Assuming  $g$  is an **even** function, evaluate  $g(-9)$ .

If function  $g$  is even, then

$$g(-9) = 6$$

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7. A function,  $f$ , is **even** if  $f(x) = f(-x)$  for all  $x$  in the domain. A function,  $g$ , is **odd** if  $g(x) = -g(-x)$  for all  $x$  in the domain.

Let polynomial  $p$  be defined with the following equation:

$$p(x) = -x^3 + 1$$

- a. Express  $p(-x)$  as a polynomial in standard form.

$$p(-x) = -(-x)^3 + 1$$

$$p(-x) = x^3 + 1$$

- b. Express  $-p(-x)$  as a polynomial in standard form.

$$-p(-x) = -(x^3 + 1)$$

$$-p(-x) = -x^3 - 1$$

- c. Is polynomial  $p$  even, odd, or neither?

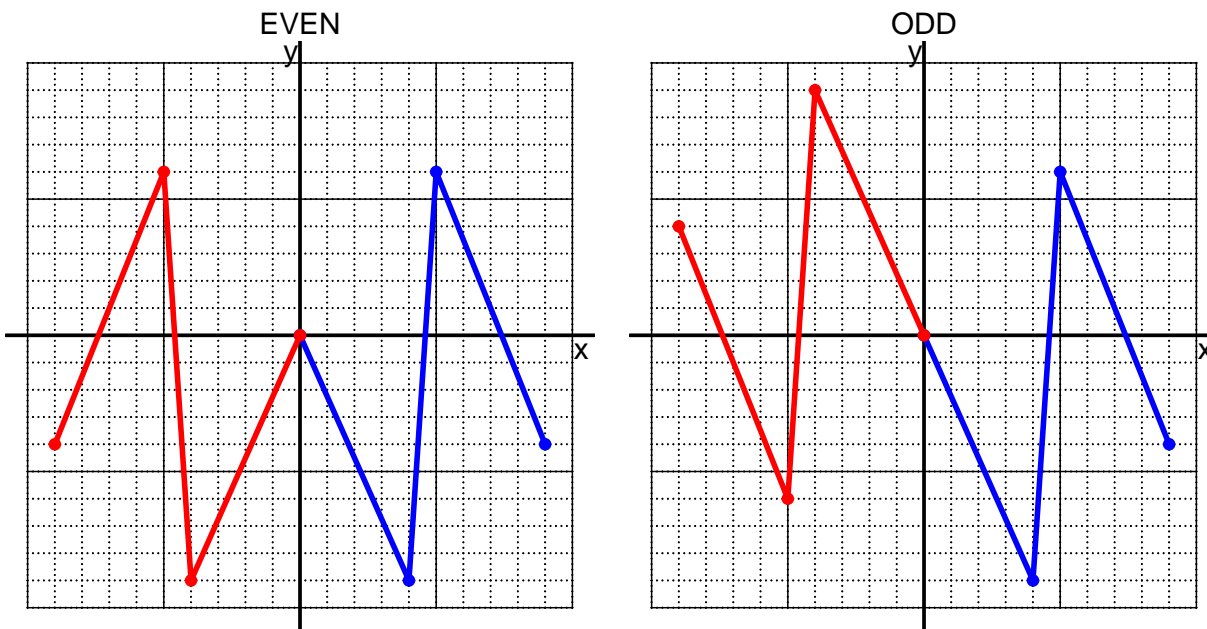
neither

- d. Explain how you know the answer to part c.

We see that  $p(x)$  is not equivalent to either  $p(-x)$  or  $-p(-x)$ , so  $p$  is neither even nor odd.

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8. I have drawn half of a function. Draw the other half to make it even or odd.



9. Let function  $f$  be defined with the equation below.

$$f(x) = \frac{x}{3} - 7$$

a. Evaluate  $f(57)$ .

step 1: divide by 3  
step 2: subtract 7

$$\begin{aligned} f(57) &= \frac{(57)}{3} - 7 \\ f(57) &= 12 \end{aligned}$$

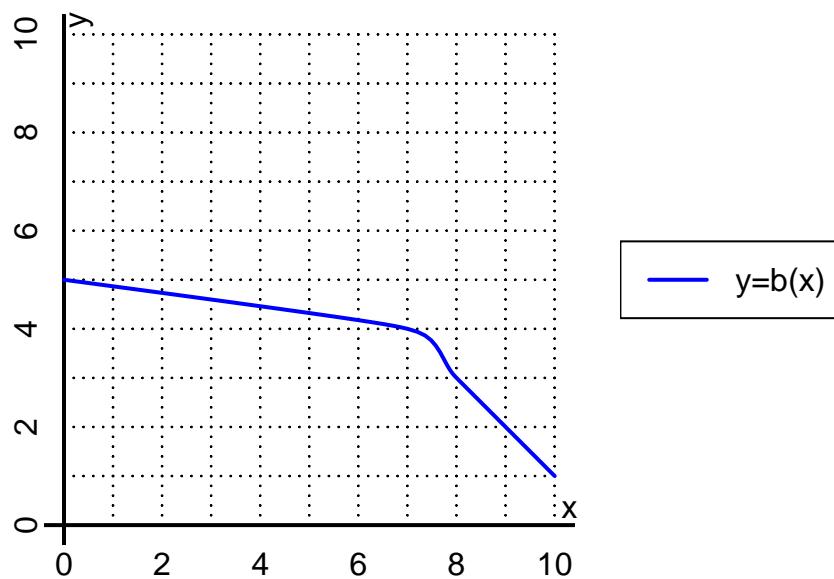
b. Evaluate  $f^{-1}(6)$ .

step 1: add 7  
step 2: multiply by 3

$$\begin{aligned} f^{-1}(x) &= 3(x + 7) \\ f^{-1}(6) &= 3((6) + 7) \\ f^{-1}(6) &= 39 \end{aligned}$$

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10. The function  $b$  is represented by the curve  $y = b(x)$  graphed below.



a. Evaluate  $b(7)$ .

$$b(7) = 4$$

b. Evaluate  $b^{-1}(3)$ .

$$b^{-1}(3) = 8$$

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11. Function  $f$  is defined by the table below.

a. Complete the columns for  $-f(x)$  and  $f(-x)$  and  $-f(-x)$ .

$x$	$f(x)$	$-f(x)$	$f(-x)$	$-f(-x)$
-2	9	-9	-9	9
-1	-6	6	6	-6
0	0	0	0	0
1	6	-6	-6	6
2	-9	9	9	-9

b. Is function  $f$  even, odd, or neither?

odd

c. How do you know the answer to part b?

Function  $f$  is odd because column  $-f(-x)$  matches column  $f(x)$  exactly.